

GSM KEY

GSM based access controller



User manual

v 1.2



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Table of Contents

1 Introduction.....	3
1.1 Controller features.....	4
2 Device specification.....	4
2.1 Electrical specification.....	4
2.2 GSM.....	5
2.3 Communication interface.....	5
2.4 Enclosure.....	5
3 Front and rear panels.....	5
3.1 Front panel.....	5
3.2 Rear panel.....	6
4 Operating principle.....	6
5 GSMKey controller configuration.....	7
5.1 Rear panel dip switch.....	7
5.2 GSMKey operation using SIM card phone book.....	8
5.3 Configuration using an external PC – „GSMKeyManager” application.....	10
5.3.1 Main window	10
5.3.2 GSMKey controller status panel (GSMKey state).....	11
5.3.3 User list stored in GSMKey controller memory (Device phone book tab).....	12
5.3.4 User list stored on SIM card (SIM phone book tab).....	13
5.3.5 Activity log panel (Log tab).....	15
5.3.6 Menu.....	16
5.3.7 Configuration window.....	17
5.3.8 Prepaid card status window.....	19
5.4 Configuration from a PC using the serial communication / terminal console mode.....	20
5.4.1 Communication parameters.....	20
5.4.2 Modem echo on / off.....	20
5.4.3 Console echo on / off.....	20
5.4.4 Battery status.....	20
5.4.5 Power supply status.....	20
5.4.6 Configuration DIP switch setting readout.....	21
5.4.7 Entry of user details to the device memory.....	21
5.4.8 Readout of user details from the device memory.....	21
5.4.9 Readout of a range of user details from the device memory.....	22
5.4.10 Deleting a user from device memory.....	22
5.4.11 Readout of device log.....	22
5.4.12 Clearing the device log.....	22
5.4.13 Entry of the SIM card PIN.....	22
5.4.14 Deleting the SIM card PIN.....	22
5.4.15 Checking if a PIN was entered.....	22
5.4.16 Configuration of the digital inputs.....	23
5.4.17 Readout of the digital input status.....	23
5.4.18 Power failure alarm configuration.....	23
5.4.19 Readout of power failure alarm status.....	23
5.4.20 Readout of the device firmware version information.....	23
5.4.21 Readout of the relay opening/closing time settings.....	23
5.4.22 Entry of the relay opening/closing time settings.....	24
5.4.23 Readout of the GSM operator information.....	24
5.4.24 Entry of the GSM operator information.....	24
5.4.25 Readout of the prepaid credit alarm amount.....	24
5.4.26 Entry of the prepaid credit alarm amount.....	24

1 Introduction

GSMKey allows for building access control using GSM for a large number of users. The lack of costs related to user identification, wide variety of configuration options for each of the users and recording all of activities in nonvolatile memory make **GSMKey** a better and cheaper alternative to RFID, radio-controlled (remote controller) or similar systems. The totally **free** ability to add new users or change the authorization level for each of them (no need to issue or reprogram remote controllers, ID cards, keys etc.) make **GSMKey** an ideal solution for:

- parking lots at various institutions, companies, housing estates or communities,**
- public parking lots,**
- gates to various premises,**
- warehouses,**
- stockyards,**
- all types of facilities frequented by a large number of individuals and/or with frequent changes of their authorization levels.**

1.1 Controller features

- The user is recognized based on his telephone number (calling line identification presentation - CLIP) – **no call connection costs**.
- Each user can be assigned from one to four output devices (gates, doors, locks etc.).
- Ability to enter up to 500 users in the controllers memory.
- Additionally a few hundred users can be stored on the SIM card (depends on the GSM operator).
- Built-in nonvolatile memory activity log (each activity, like opening of gates, power loss etc. is logged in this memory) for up to 500 entries.
- Ability to operated in general access mode (any user can enter the object, having his telephone numbered logged along with the time of entry.) This feature can be useful for public parking lots, stockyards, landfills etc.
- 4 relay outputs.
- 2 inputs with configurable SMS alarms (eg. Opening of the electrical switch box, blocked gate etc.).
- Built-in battery allowing for few hours of operation without external power.
- Automatic monitoring of account status when used with prepaid services.
- Ability to configure alarms notifying about lack of external power or low credit on the prepaid card.
- Easy configuration using a PC (using the included software application or console mode – allowing for integration with other existing systems) as well as based on the information stored on the SIM card (configurable using any cell phone).

2 Device specification

2.1 Electrical specification

Power supply.....	24V AC/DC
Current (max).....	300mA
Relay outputs	250V/16A
Digital inputs.....	passive (open/closed) contacts

2.2 GSM

Operating mode.....	900/1800/1900MHz
Antenna connector.....	SMA
SIM card.....	3V/1.8V

2.3 Communication interface

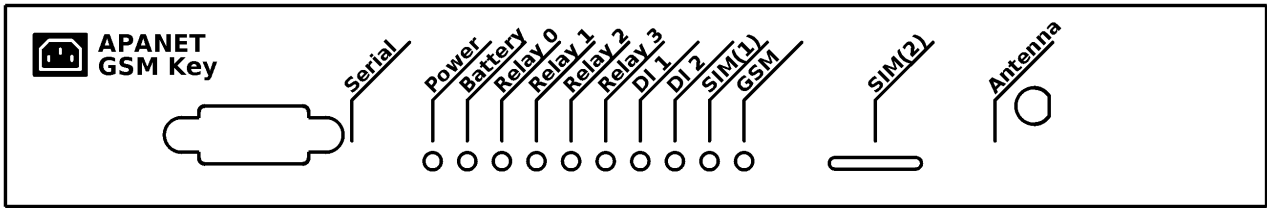
Serial interface	RS232, 9 pin D-SUB 9 female connector
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2.4 Enclosure

Dimensions.....	225x165x40[mm]
Weight.....	500[g]

3 Front and rear panels

3.1 Front panel



Serial – RS-232 connector

Power – external power indicator

Battery – built-in battery / charge status

Relay 0-3 – relay (0-3) output status

DI 1,2 – input (1,2) status

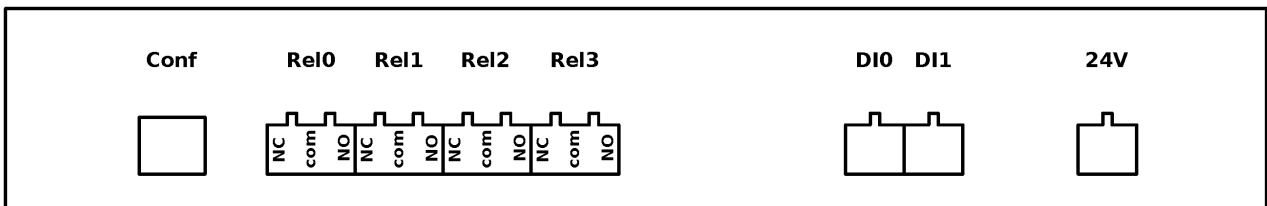
SIM(1) – SIM card status

GSM – GSM modem status

SIM(2) – SIM card slot

Antenna – antenna connector

3.2 Rear panel



Conf – configuration dip switch

Rel0-3 – relay outputs (NC – normally closed, NO – normally open, com – common)

DI0,1 – passive (open/closed) digital inputs

24V – 24V AC/DC power supply socket

4 Operating principle

When a user dials the phone number assigned to the GSMKey controller, the device identifies his number and based on his preconfigured options (authorization level) activates the required relays. The relay outputs can be connected to a variety of target devices, such as gateway actuators, door locks or other access control systems. After performing the identification the call connection is refused, which eliminates any costs (the only cost is the cost of maintaining the phone number – either subscription plan or pre-paid card).

Each positive identification is stored in the non-volatile memory activity log (detailed time, incoming call phone number and reaction of the controller). This memory allows for 500 entries and operates in FIFO mode (if the memory is exceeded the newest records overwrite the oldest ones).

The GSMKey controller can also operate in general access mode, where each incoming call generates a positive ID, whilst the device records appropriate event information in the activity log.

The GSMKey controller also has alarm features. Alarms can be triggered through the digital inputs, loss of external power or low credit on the pre-paid card.

The controller allows for very flexible configuration of operating parameters:

- reaction time for each of the relay outputs (relay open/close time from 1 to 999 seconds),
- alarm delay for each of the digital inputs (alarm will be triggered after exceeding a predefined time of 1 to 999 seconds),
- alarm input trigger type (alarm can be triggered by either closing or opening the input contacts),
- alarm delay for loss of power supply (similar to the digital inputs),
- credit amount below which the system will alarm about the pre-paid card running out,
- each user can be assigned a different reaction of the relay outputs or the alarm inputs,
- each user stored on the SIM card can be assigned a different reaction for each of the relay outputs (extended mode) or only one relay output or only one alarm (simplified mode).

5 GSMKey controller configuration

5.1 Rear panel dip switch

The dip switch on the rear panel has 4 switches, which allow for activation/deactivation of the following options:

- switch 1** – activates (ON position) or deactivates user (incoming call) identification based on the entries on the SIM card.
- switch 2** – activates (ON position) or deactivates user (incoming call) identification based on the entries in the device memory.
- switches 1 and 2 in the ON position** – operation in the general access mode – each incoming call will activate the „**Rel0**” relay output
- switch 3** – activates (ON position) or deactivates SMS alarms for user numbers entered on the SIM card.
- switch 4** – activates (ON position) or deactivates SMS alarms for user numbers entered in the device memory.

5.2 GSMKey operation using SIM card phone book

This mode of operation allows GSMKey to use information stored on a SIM card, which can be configured without the use of a PC computer. There are two possible usage options:

Simplified mode – where only one relay output or one alarm can be assigned to each user. Using any cell phone, the system administrator should enter user phone numbers into the SIM card memory, using the following naming convention:

- users whose name begins with „**R0**” or „**r0**” will be assigned to relay output **Rel0** (e.g. „R0user230”)
- users whose name begins with „**R1**” or „**r1**” will be assigned to relay output **Rel1** (e.g. „R1user231”)
- users whose name begins with „**R2**” or „**r2**” will be assigned to relay output **Rel2** (e.g. „R0user232”)
- users whose name begins with „**R3**” or „**r3**” will be assigned to relay output **Rel3** (e.g. „R0user233”)

- users whose name begins with „**D1**” or „**d1**” will be sent an alarm message triggered by digital input **DI1** (e.g. „D1user234”)
- users whose name begins with „**D2**” or „**d2**” will be sent an alarm message triggered by digital input **DI2** (e.g. „D2user235”)
- users whose name begins with „**PWR**” or „**pwr**” will be sent an alarm message triggered by **external power failure** (e.g. „PWRuser236”)
- users whose name begins with „**MN**” or „**mn**” will be sent an alarm message triggered by **low credit** on the pre-paid card (e.g. „MNuser237”)

Advanced mode – where each user can be assigned any combination of relay outputs or alarm options. In the advanced mode the user name should start with the text „0x” or „0X” (first character is a zero). Where the following two characters define the relay outputs and alarms:

The first character defines the relay outputs:

Name	Rel3	Rel2	Rel1	Rel0	Name	Rel3	Rel2	Rel1	Rel0
0x0_					0x8_	+			
0x1_				+	0x9_	+			+
0x2_			+		0xA_	+		+	
0x3_			+	+	0xB_	+		+	+
0x4_		+			0xC_	+	+		
0x5_		+		+	0xD_	+	+		+
0x6_		+	+		0xE_	+	+	+	
0x7_		+	+	+	0xF_	+	+	+	+

The second character defines the alarms:

Name	'Money'	Power	DI2	DI1	Name	'Money'	Power	DI2	DI1
0x_0					0x_8	+			
0x_1				+	0x_9	+			+
0x_2			+		0x_A	+		+	
0x_3			+	+	0x_B	+		+	+
0x_4		+			0x_C	+	+		
0x_5		+		+	0x_D	+	+		+
0x_6		+	+		0x_E	+	+	+	
0x_7		+	+	+	0x_F	+	+	+	+

Here are a few examples of user names using the advanced mode:

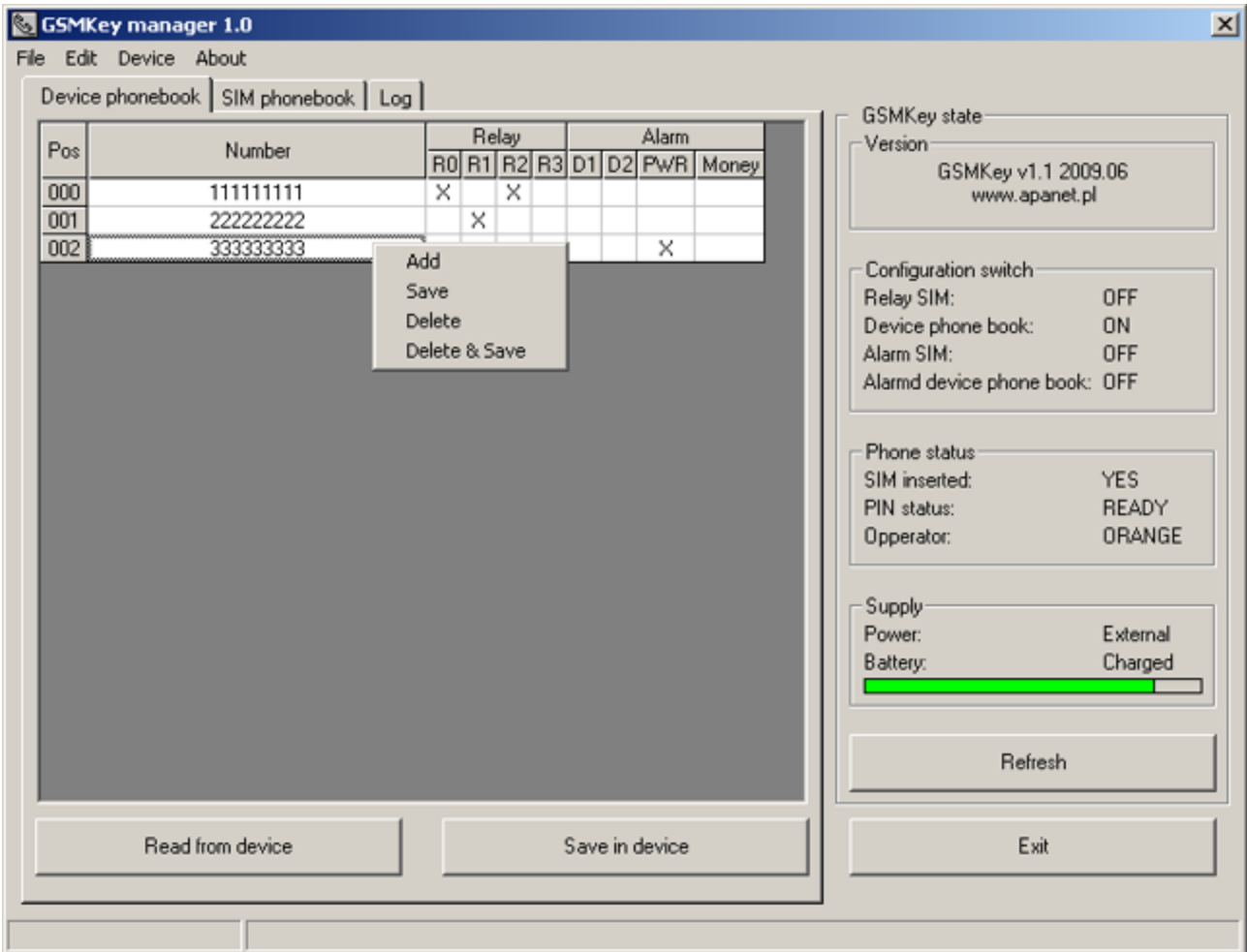
- „0x24Name1” - user „Name1” is assigned relay outputs 1 and 0 as well as the power failure alarm notification
- „0x03Name2” – user „Name2” is assigned alarm notification for digital inputs DI1 and DI2
- „0xF0Name3” - user „Name3” is assigned all relay outputs
- „0xFFName4” - user „Name3” is assigned all relay outputs as well as all alarm notifications

In case of more than one entry for the same number, the system will take into account the **first entry in the SIM card memory**.

Important: If the administrator does not use a PC to configure the GSMKey controller, it is not possible to enter a PIN code if required by the given SIM card. In order for the system to work properly, one must **disable the SIM card PIN** using the cell phone used to configure the card.

5.3 Configuration using an external PC – „GSMKeyManager” application

5.3.1 Main window



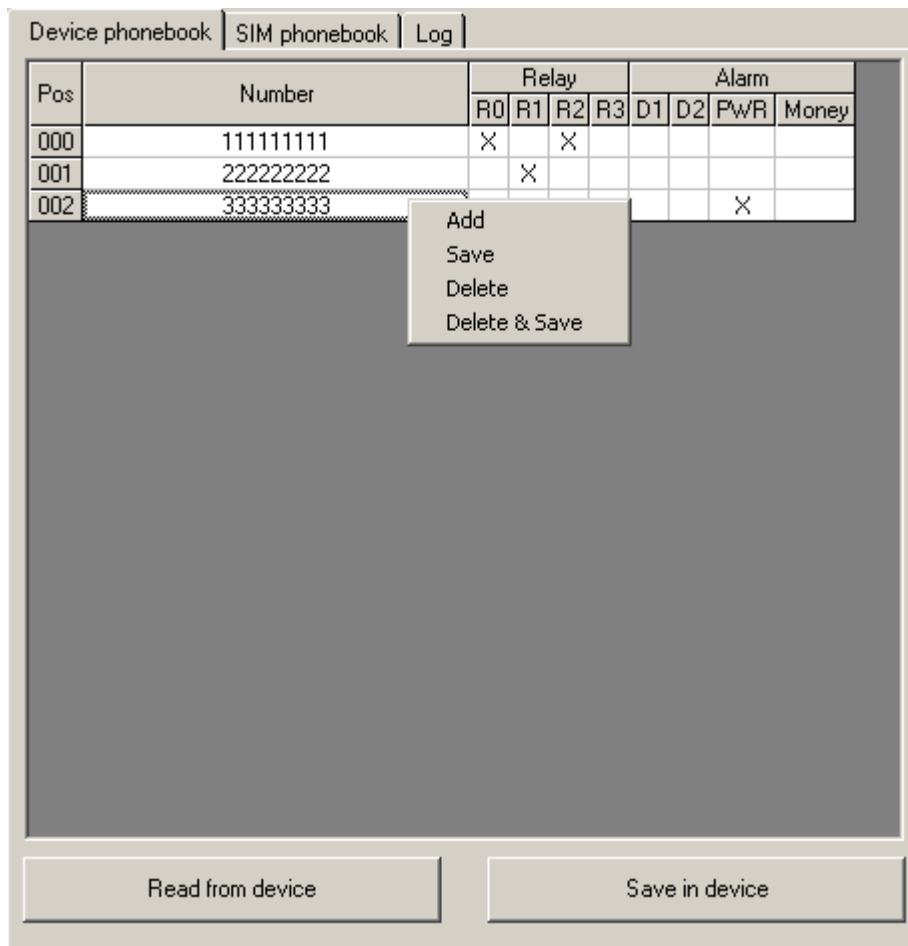
5.3.2 GSMKey controller status panel (GSMKey state)

This panel displays the basic information about the currently configured device:

- Software version (**Version**) – currently installed device firmware version
- Dip switch settings (**Configuration switch**):
 - **Relay SIM** – user identification according to SIM card data
 - **Device phone book** – user identification according to device phone book data
 - **Alarm SIM** – alarms sent to users according to SIM card data
 - **Alarm device phone book** – alarms sent to users according to device phone book data

- GSM parameters (**Phone status**)
 - **SIM inserted** – information if a SIM card was properly detected
 - **PIN status** – information about PIN code status
 - **Operator** – information about the GSM operator
- **Supply** – information about the power supply status
 - **Power** – (External) power or built in (Battery)
 - **Battery** – built in battery charge status
- **Refresh** – button used to refresh the status information

5.3.3 User list stored in GSMKey controller memory (Device phone book tab)



The above window presents a list of users stored in the device phone book:

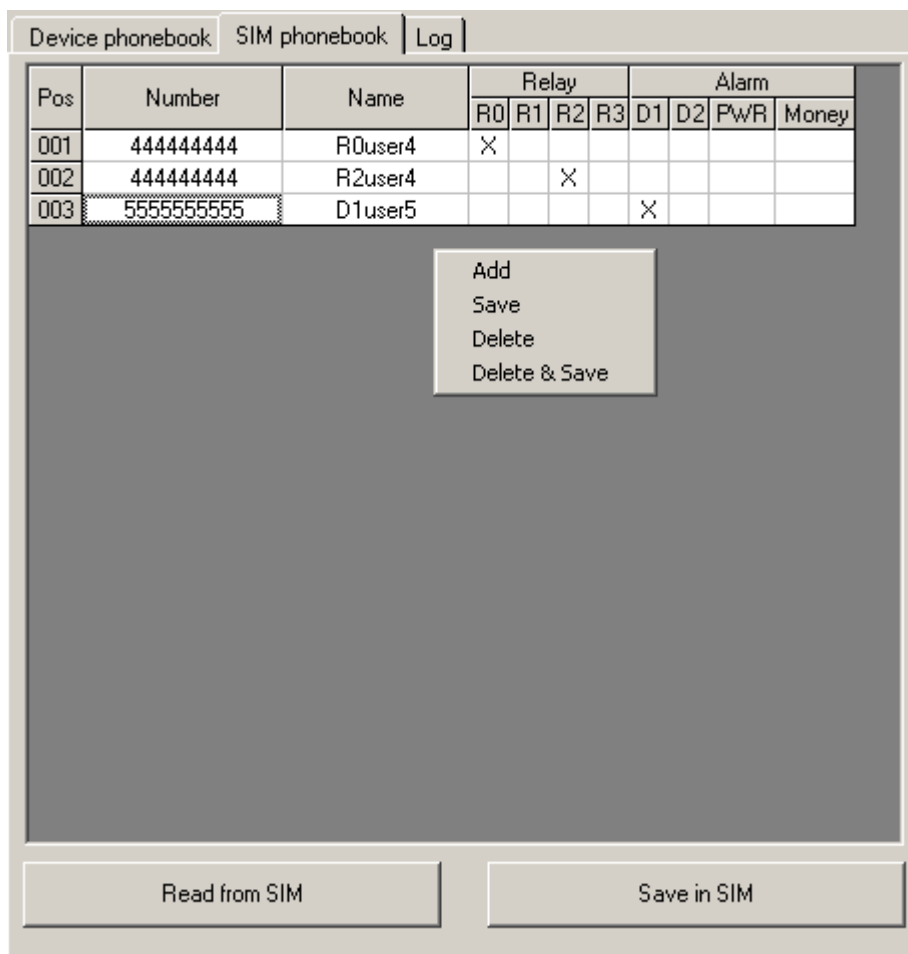
- user „111111111” is assigned access to areas controlled using the relay outputs R0 and R2
- user „222222222” is assigned access to an area controlled using the relay output R1

•user „33333333” will be notified about external power supply failures.

Description of panel structure:

- Item (**Pos**) – subsequent record number
- Phone number (**Number**) – number based on which the given user should be identified – a double click of the left mouse button allows for modification of this entry
- relay output (**Relay R0-R3**) – relay outputs assigned to the user – a double click of the left mouse button allows for enabling / disabling the selection.
- Alarms (**Alarm**) – alarms assigned to the user – a double click of the left mouse button allows for enabling / disabling the selection
 - **D1** – alarm triggered by digital input DI1
 - **D2** – alarm triggered by digital input DI2
 - **PWR** – alarm triggered by external power supply failure
 - **Money** – alarm triggered by low credits on the pre-paid card
- contextual menu (right-click)
 - **Add** – entry of new user data (the modified list has to be saved to device memory for the changes to be affected)
 - **Save** – saves the modified user list in device memory
 - **Delete** – removes the given user from the phone book (the modified list has to be saved to device memory for the changes to be affected)
 - **Delete & Save** – deletes the user and stores the modified list in device memory
- „**Read from device**” button – reads the phone book from device memory
- „**Save in device**” - stores the phone book to device memory

5.3.4 User list stored on SIM card (SIM phone book tab)



The above window presents a list of users stored on the SIM card:

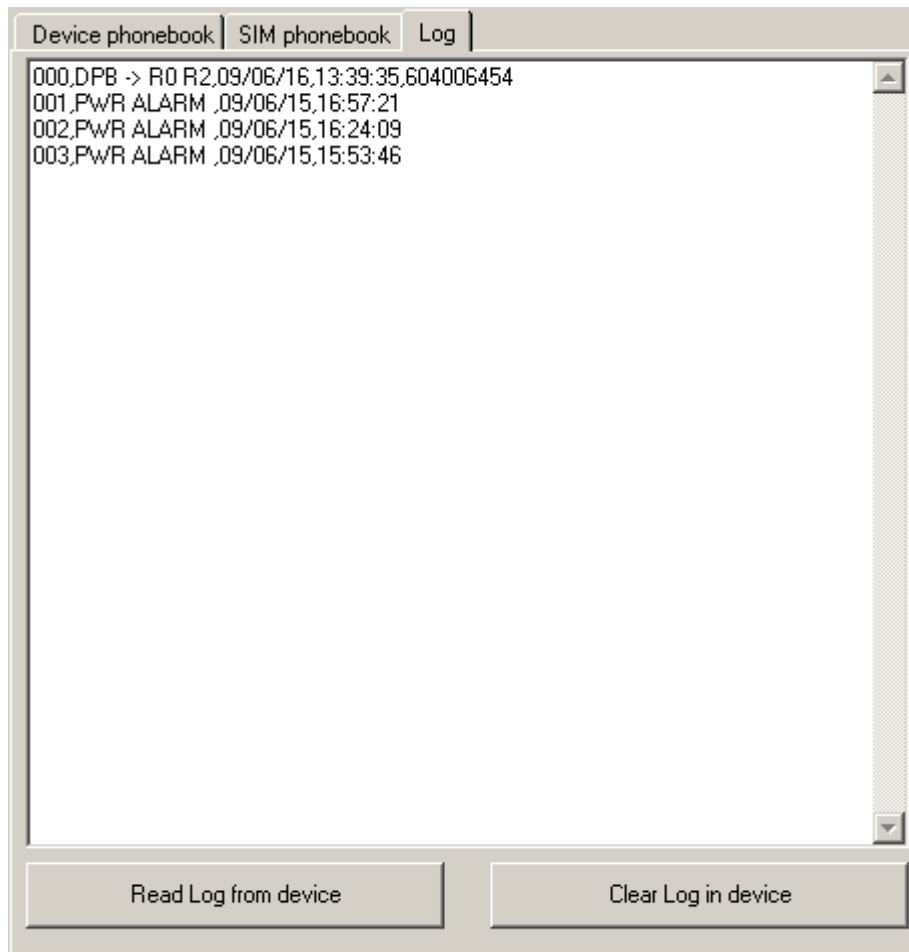
- user „444444444” is assigned access to an area controlled using the relay output R0. The second entry for the same number will be ignored by the device.
- user „555555555” will be sent an alarm triggered by digital input D1

Description of panel structure:

- Item (**Pos**) – subsequent record number
- Phone number (**Number**) – number based on which the given user should be identified – a double click of the left mouse button allows for modification of this entry
- User name (**Name**) – the user name defines the relay outputs/alarms – the naming convention is described in detail in chapter „8GSMKey operation using SIM card phone book” on page 8.

- relay output (**Relay R0-R3**) – relay outputs assigned to the user.
- Alarms (**Alarm**) – alarms assigned to the user – similar to the users stored in device memory.
- contextual menu (right-click) - similar to the users stored in device memory.
- „**Read from SIM**” button – reads the user list from SIM card memory
- „**Save in SIM**” button – stores the user list on SIM card memory

5.3.5 Activity log panel (Log tab)



The above screen shot presents a log of events recorded by the device. It lists four events in chronological order:

- event 003 - 15.06.2009 15:53:46 – loss of power supply
- event 002 - 15.06.2009 16:24:09 – loss of power supply
- event 001 - 15.06.2009 15:57:21 – loss of power supply
- event 000 - 15.06.2009 13:39:35 – user with phone number 604006454 stored in device memory (DPB - Device phone book) was granted access to areas controlled using relay outputs R0 and R2

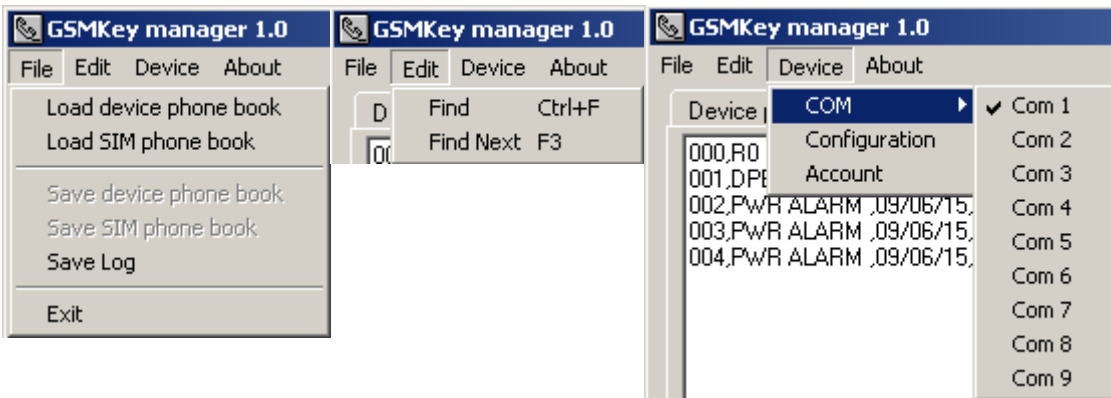
List of abbreviations used in reports:

- DPB** – user in device memory
- SIM** – user on SIM card
- R0 without PN** – access granted in general access mode
- D1 ALARM, D2 ALARM** – alarms triggered by digital inputs
- PWR ALARM** – power failure alarm
- Money ALARM** – low pre-paid credit alarm
- R0, R1, R2, R3** – relay outputs

Description of panel structure:

- „Read Log from device”** button – reads the event log from the controller
- „Clear Log in device”** button – clears the event log from controller memory

5.3.6 Menu



Menu structure:

•File

- **Load device phone book** – loads the device phone book from file
- **Load SIM phone book** – loads the SIM phone book from file
- **Save device phone book** – saves the device phone book to file
- **Save SIM phone book** – saves the SIM phone book to file
- **Save Log** – saves the logged events to file

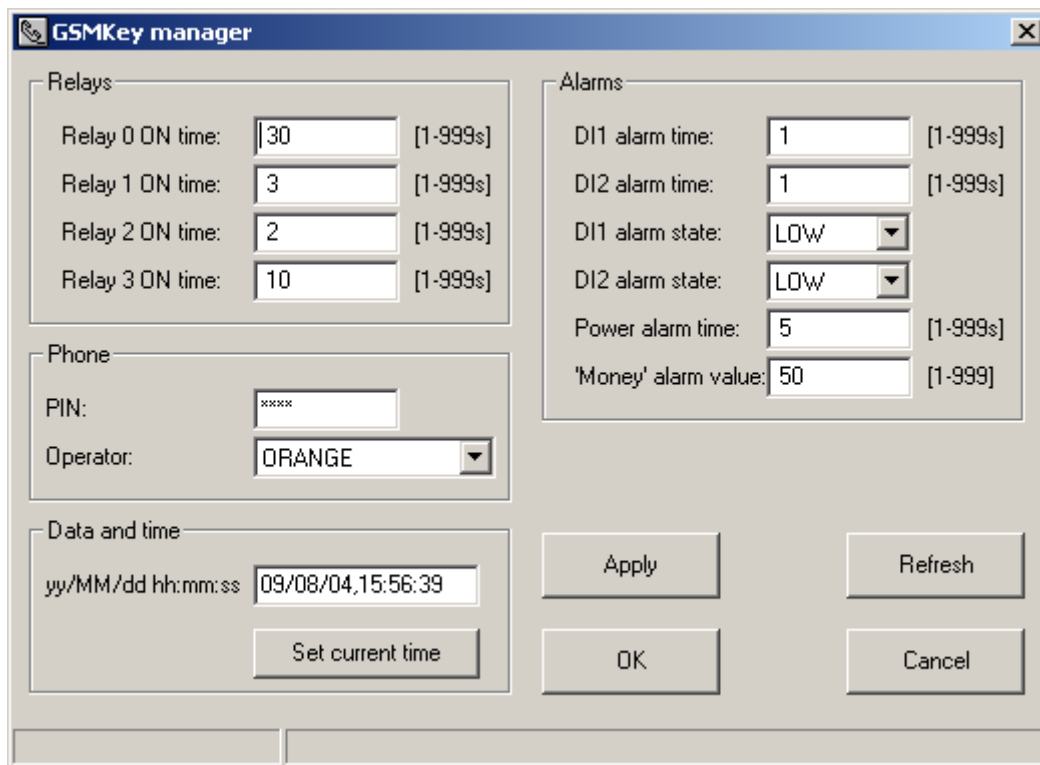
•Edit

- **Find** – finds the entered character string in the user list
- **Find Next** – finds the next occurrence of the above character string in the user list

•Device

- **COM** – selection of the COM port used to communicate with the device
 - **Configuration** – opens the device configuration window
 - **Account** – opens the account information window when the device is used with a pre-paid card
- About** – opens the application information window

5.3.7 Configuration window

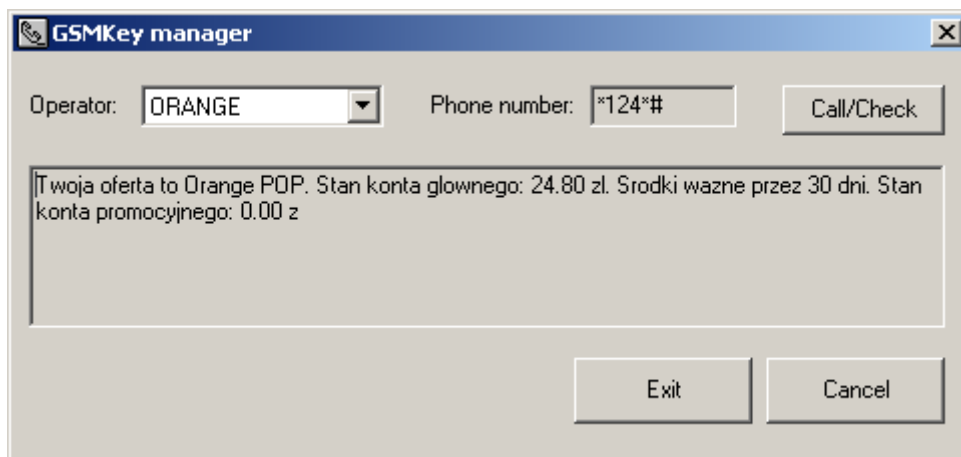


Window structure:

- „**Relays**” pane – relay output configuration: **Relay 0-3 ON time** – relay opening/closing times
- „**Phone**” pane – GSM related options
 - **PIN** – PIN code for the inserted SIM card
 - **Operator** – GSM operator
- „**Data and time**” pane – current date and time
 - „**Set current time**” button – sets the current time in of the device RTC according to the time of the configuring PC
- „**Alarms**” pane – alarm configuration options
 - **DI1-DI2 alarm time** – delay before a given event (digital inputs) causes an alarm trigger – i.e. triggers shorter than this time will not cause alarm messages to be sent
 - **DI1-DI2 alarm state** – condition of the digital input causing the alarm trigger (either open or closed contacts)
 - **Power alarm time** – power failure time period after which an alarm is triggered. If power is restored before this time and alarm message will not be sent out.

- **'Money' alarm value** – pre-paid credit amount below which an alarm is triggered. Value is stated in the currency used by the phone operator.
- „**Apply**” button – saves the configuration changes to the device
- „**Refresh**” button – rereads the configuration data from the device
- „**OK**” button – saves the configuration changes to the device and closes the window
- „**Cancel**” button – closes the window without saving the configuration changes

5.3.8 Prepaid card status window



Window structure:

- **Operator** – selection of the GSM operator.
- **Phone number** – phone number sequence required to query the operator for the current account status. In case of operators other than preconfigured in the application (Other selection), the user is able to enter his own sequence (please ask your phone operator for the required details).
- „**Call/Check**” button – sends out a query to the operator about the current account status. The response should usually be received within a few seconds.
- Response window will show the information received from the operator about the current pre-paid account status.
- „**Exit**” button - closes the window.
- „**Cancel**” button – cancels the request for the response from the operator.

5.4 Configuration from a PC using the serial communication / terminal console mode

The GSMKey controller serial interface allows for easy configuration of the device from practically any terminal application (e.g. HyperTerminal) as well as for easy integration with other administration software.

5.4.1 Communication parameters

- communication speed: 115kbps
- data bit: 8
- parity: none
- stop bits: 1
- flow control: none

5.4.2 Modem echo on / off

*MECHO0 – off

*MECHO1 - on

5.4.3 Console echo on / off

*CECHO0 – off

*CECHO0 – on

5.4.4 Battery status

query string: *BATT

response: BATT <val>,<charging>

<val> - battery charge status 001-255, 000 - no battery

<charging> - 0 = not charging, 1 = charging

5.4.5 Power supply status

query string: *PWR

response: PWR <val>

<val> - 1 = external power supply, 0 = built-in battery power supply

5.4.6 Configuration DIP switch setting readout

query string: *CGSW

response: CGSW <val1>,<val2>,<val3>,<val4>

<val1> - condition of CONF1

<val2> - condition of CONF2

<val3> - condition of CONF3

<val4> - condition of CONF4

5.4.7 Entry of user details to the device memory

*WPN <pos>,<rel>,<number>

<pos> - list position 000-999

<rel> - relay and alarm settings 0x00-0xFF

bit0 – Rel0

bit1 – Rel0

bit2 – Rel0

bit3 – Rel0

bit4 – Alarm DI1

bit5 – Alarm DI2

bit6 – Alarm PWR

bit7 – Alarm 'Money'

<number> - phone number

5.4.8 Readout of user details from the device memory

query string: *RPN <pos>

<pos> - list position 000-999

response: RPN <pos>,<rel>,<number>

<pos> - list position 000-999

<rel> - relay and alarm settings 0x00-0xFF

<number> - phone number

5.4.9 Readout of a range of user details from the device memory

query string: *RPN <pos1>,<pos2>

<pos1> - starting position 000-999

<pos2> - end position 000-999

response: RPN <pos>,<rel>,<number> - for each number found in device memory

*COK

5.4.10 Deleting a user from device memory

*CPN <pos>

<pos> - list position 000-999

5.4.11 Readout of device log

query string: *RLOG <nbr>

<nbr> number of last log entries which should be read

response: RLOG <pos>,<type>,<time stamp>,<tel> - for each entry found in device memory

*COK

<nbr> - index 0-last, 1 - previous etc.

<type> - event type

<time stamp> - time of the event

<tel> - phone number

5.4.12 Clearing the device log

*CLOG

5.4.13 Entry of the SIM card PIN

*WPIN <pin>

5.4.14 Deleting the SIM card PIN

*DPIN <pin>

5.4.15 Checking if a PIN was entered

*EPIN

5.4.16 Configuration of the digital inputs

*SDI <din>,<idle>,<on time>

<din> - input port [0,1]

<idle> - configuration of the free state [0=open,1=closed]

<ontime> - alarm trigger delay 000-999 [s]

5.4.17 Readout of the digital input status

query string: *RDI <din>

<din> -input port [0,1]

response: *RDI <din>,<idle>,<ontime>

5.4.18 Power failure alarm configuration

*SPW <time>

<time> - alarm trigger delay 000-999 [s]

5.4.19 Readout of power failure alarm status

query string: *RPW

response: *SPW <time>

5.4.20 Readout of the device firmware version information

query string: *FRM

response: <firmware version>

*COK

5.4.21 Readout of the relay opening/closing time settings

query string: *RRT <rn>

response: *RRT <rn>,<time>

<rn> - relay number [0,3]

<time> - time period 000-999 [s]

5.4.22 Entry of the relay opening/closing time settings

*SRT <rn>,<time>

5.4.23 Readout of the GSM operator information

query string: *ROP

response: *ROP <op>

<op> - operator 0-2; 0-off

5.4.24 Entry of the GSM operator information

*SOP <op>

5.4.25 Readout of the prepaid credit alarm amount

query string: *RMN

response: *RMN <mn>

<mn> - value 000-999 in the currency used by the operator

5.4.26 Entry of the prepaid credit alarm amount

*SMN <mn>